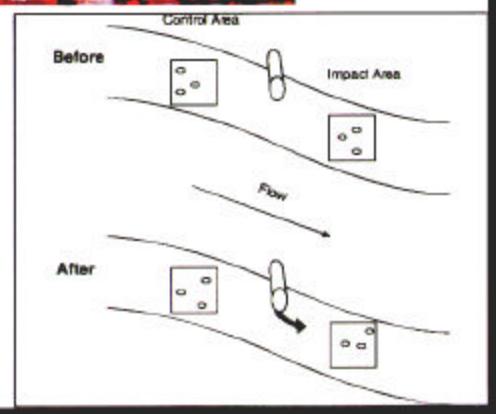
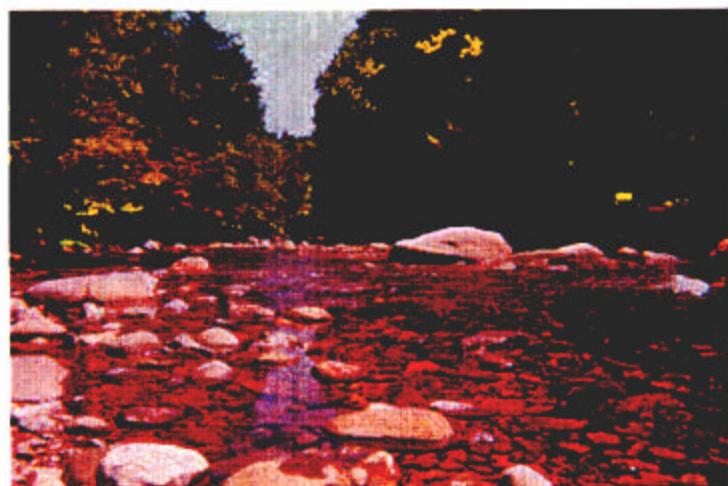
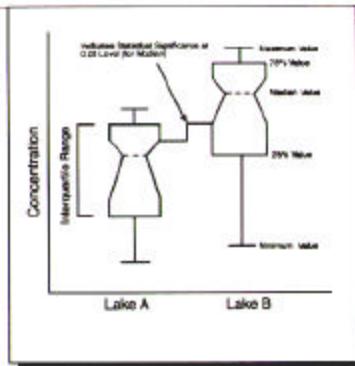
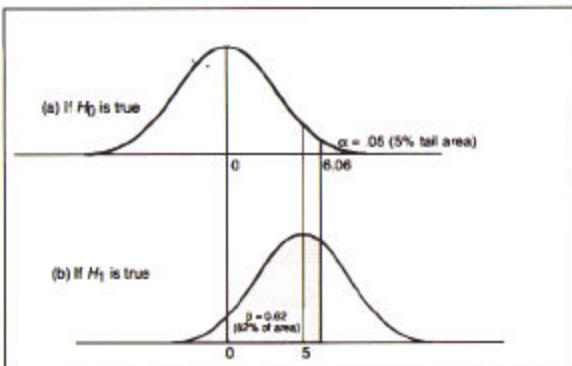




Biological Criteria: Technical Guidance For Survey Design and Statistical Evaluation of Biosurvey Data



BIOLOGICAL CRITERIA

Technical Guidance for Survey Design and Statistical Evaluation of Biosurvey Data

Prepared for EPA by TetraTech, Inc.

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Disclaimer

This manual provides technical guidance to States, Indian Tribes, and other users of biological criteria to assist with survey design and statistical evaluation of biosurvey data. While this manual constitutes EPA's scientific recommendations regarding survey designs and statistical analyses, it does not substitute for the CWA or EPA's regulations; nor is it a regulation itself. Thus, it cannot impose legally binding requirements on the EPA, States, Indian Tribes, or the regulated community, and might not apply to a particular situation or circumstance. EPA may change this guidance in the future.

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FOREWORD

Biological Criteria: Technical Guidance for Survey Design and Statistical Evaluation of Biosurvey Data, by Kenneth H. Reckhow and William Warren-Hicks, was prepared for the U.S. Environmental Protection Agency to help states develop their biological criteria for surface waters and specifically to help water resource managers assess the reliability of their data. A good biological criteria program will be practical and cost effective, but above all it will be predicated on valid and scientifically sound information.

The application of the concepts and methods of statistics to the biological criteria process enables us "... to describe variability, to plan research so as to take variability into account, and to analyze data so as to extract the maximum information and also to quantify the reliability of that information"

(Samuels, 1989).

This initial guidance document is intended to reintroduce statistics to the natural resources manager who may not be current in the application of this tool (and our ranks are legion, we just don't like to admit it). The emphasis is on the practical application of basic statistical concepts to the development of biological criteria for surface water resource protection, restoration, and management. Subsequent guides will be developed to expand on and refine the ideas presented here.

Address comments on this document and suggestions for future editions to George Gibson, U.S. Environmental Protection Agency, Office of Water, Office of Science and Technology (4304), 401 M Street, S.W., Washington, D.C. 20460.